PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

A Compressor or Pump of the Rotary Abutment Type

We, ETABLISSEMENT STUDIA TECHNICA, a Body Corporate organized under the Laws of the Principality of Liechtenstein, of Vaduz, Liechtenstein, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a rotary machine, more particularly a compressor or pump, comprising two motors in engagement, one of which forms a distributor and is formed with cavities engaged by matching projections on the other rotor, the rotors having parallel shafts, being mounted in bores in a stator and co-operating to define a space forming a variable capacity chamber for the fluid for compression or pumping, which fluid enters through a suction port and leaves through a final delivery port, the rotor shafts being interconnected by external gearing.

In the machine according to the invention, the stator wall contains at least one passage so interconnecting the bores for the two rotors that delivery is performed in two stages—in the first stage through the said passage and a cavity in the distributor rotor, and in the second stage directly through the latter cavity and the final delivery port, and valve means are provided for varying the flow of compressed fluid through an additional port so that the compression ratio can be varied without changing the speed of rotation.

Two embodiments of the machine which is the subject of this application are shown by way of example in the accompanying drawings, wherein:

Figure 1, which is an axial section on a line I—I in Figure 2, shows a first embodiment but without the rotors;

Figure 2 is a section on a line II—II in Figure 1, and

Figure 3 is a section similar to Figure 2 through a second embodiment.

The rotary machine shown in Figures 1 and 2 in a compressor and has two rotors 1, 2 in engagement. These rotors are mounted in bores 3, 4 respectively in a stator 5 and have parallel shafts intermediate by external gearing (not shown). The bores 3, 4 have the end walls 5^1 visible in Figure 1. Between the rotors 1, 2 there is a space 6 which acts as a variable-capacity chamber C for the fluid being compressed. This fluid enters through a suction port 7 and leaves through a final delivery port 8 communicating with the bore 4 by a duct 9.

The rotor 2 acts as a distributor and has two cavities 10, 10^1 in which matching projections 11, 11^1 on the rotor 1 engage successively as the two rotors turn. Two passages 12 are arranged symmetrically on each side of the duct 9 in the stator wall between the two rotor bores 3, 4. One end of each passage 12 debouches into the bore 3 at an aperture 13 and the other end of the passage 12 debouches into the bore 4 at an aperture 14.

The partition separating the final delivery port 8 from the bore 4 is cast with the stator 5 and has in addition to the duct 9 a circular or oblong port 15 controlled by a manual or spring-loaded non-return valve 16 enabling the compression ratio of the compressor to be altered as desired. Several such valves may be provided in order to give different compression ratios. Moreover, the same result can be obtained by arranging the or each delivery port in the stator end walls 5^1.

The compressor operates as follows:

The rotors run at the same speed in the directions of the arrows. During each revolution the rotors perform two intake and delivery cycles.

[*Price* 4*s*. 6*d*.]

Price 75p

The delivery cycle, which is a very interesting feature of the compressor described, is performed in two stages. During the first stage the compressed fluid from the space 6 enters the cavity 10^1 in the distributor rotor 2 through the passages 12 and discharges through the duct 9 and port 8. During the second stage, the rotors 1, 2 have turned and the compressed fluid then passes directly from the bore 3 into the cavity 10 in the distributor rotor and thence into the duct 9 and delivery port 8, the outlets 14 of the passages 12 having been closed by the distributor rotor 2.

The space 6 can be varied simply by controlling the flow of compressed fluid through the passage 12 by varying the closure of the port 15. The compressed gas cannot return to the chamber C from the port 8 when the apertures 14 are closed by the rotor 2 and the apertures 13 by the rotor 1.

In order to minmise gas losses due to expansion in the passages 12, the same have the minimum volume compatible with the necessary conduit section.

In the compressor described, one of the cavities 10, 10^1 in the distributor rotor 2 acts as a valve and the other, by collecting leakage along the bore 4, acts as a seal.

In the compressor shown in Figure 3, a duct 17 along part of the inner periphery of the bore 3 for the rotor 1 connects the compression zone of the compressor to the intake port 7 through a port 18, so that excess fluid can be returned to the suction side at the start of the compression stage and the compressor delivery can be varied. The port 18 is opened or closed by means of a manual spring-loaded non-return valve 19 which allows the output of the compressor to be varied while it is running.

Changing the output of the compressor also changes the compression ratio, since the total enclosed volume F_1+F_2 of the compressor is variable.

For operation at maximum output, delivery starts at the additional port 15 which is opened by means of the valve 16, the bypass valve 19 being closed. For operation at partial output, the valve 19 is opened and the valve 16 is closed. The positions of the bypass and delivery ports depend on the running conditions of the machine. Several ports 18 may be provided, with or without closure members. When the valve 19 is closed, its inner end must fit exactly into the wall of the bore 3 in the stator. Alternatively, the ports 18 may be in the end walls 5^1 of the stator.

The machine shown in Figure 3 also has the valve means 15, 16 for varying the compression ratio as described with reference to Figure 2. Of course, when the valve 16 is closed, the machine has only the valve means 18, 19 for varying the output, whereas when the valve 19 is closed the machine similar to that described with reference to Figures 1 and 2.

One advantage of the machine described is that either the compression ratio or the output can be varied without changing the speed of rotation or throttling the suction port.

WHAT WE CLAIM IS:—

1. A rotary machine, more particularly a compressor or pump, comprising two rotors in engagement, one of which forms a distributor and is formed with cavities engaged by matching projections on the other rotor, the rotors having parallel shafts, being mounted in bores in a stator and co-operating to define a space forming a variable-capacity chamber for the fluid for compression or pumping, which fluid enters through a suction port and leaves through a final delivery port, the rotors shafts being interconnected by external gearing, characterised in that the wall of the stator contains at least one passage so interconnecting the bores for the two rotors that delivery is performed in two stages—in the first stage through the said passage and a cavity in the distributor rotor, and in the second stage directly through the latter cavity and the final delivery port, and further characterised in that valve means are provided for varying the flow of compressed fluid through an additional port so that the compression ratio can be varied without changing the speed of rotation.

2. A machine as claimed in Claim 1, characterised in that it comprises a partition cast with the stator and closing part of the delivery port, an additional port in the said partition, and at least one closure member controlling the opening and closing of said additional port so as to change the compression ratio.

3. A machine as claimed in Claim 1, characterised in that it comprises a duct extending along part of the inner periphery of the rotor bore and connecting the compression zone to the intake port through at least one port so as to return excess fluid to the intake port at the start of the compression phase, thereby allowing the machine output to be varied, and means for varying the fluid flow through the duct.

4. A machine as claimed in Claim 3, characterised in that it comprises an adjustable closure member for varying the flow cross-section of the port opening into the compression zone.

5. A rotary machine constructed and

arranged substantially as described herein with reference to Figures 1 and 2, or Figure 3, of the accompanying drawings.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig. 3

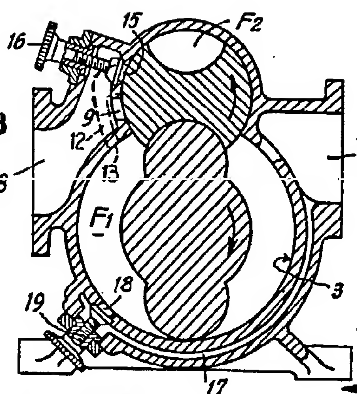

Fig. 1.

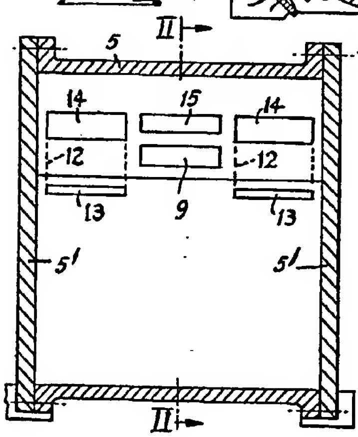

Fig. 2.